NOAA SECTORAL APPLICATIONS RESEARCH PROGRAM (SARP)
PROJECT ANNUAL REPORT

PROJECT TITLE

Water Transitions: Helping the Formal and Informal Urban Water Sectors in Developing Country Cities Adapt to Climate Change

INVESTIGATORS
(Research team and full contact information)

Lead Principal Investigators:
Peter Gleick, Pacific Institute, 654 13th Street, Oakland, CA, 94612, pgleick@pacinst.org

Marcus Moench, Institute for Social and Environmental Transition, 948 North Street, Suite 9, Boulder, CO 80304, moenchm@i-s-e-t.org;

Principal Investigator:
Meena Palaniappan, Pacific Institute, 654 13th Street, Oakland, CA, 94612, mpal@pacinst.org

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PROJECT YEARS **2**

TIME PERIOD ADDRESSED BY REPORT *(e.g., August 2002-March 2003)*

March 2009 – March 2010

I. PRELIMINARY MATERIALS

A Project Abstract *(Limit to one page)*

Water resource managers in developing country cities face complex challenges including the lack of infrastructure and adequate management mechanisms to provide for the needs of populations, the web of different water sources accessed by residents, and multifaceted relationships with the informal water sector. Climatic variability adds a new dimension to these challenges, and requires a new set of tools to help water resource managers understand the potential impacts of climate change and some planning strategies to provide resilience in the face of change.

The project will involve a collaboration between two of the leading international NGOs working on the science and policy of climate, water resources, management, and adaptation: the Pacific Institute and ISET, working together with local partners in South and Southeast Asia. The goal of this project is to develop a framework as well as few key tools to guide water resource managers in the formal sector in understanding the potential impacts of climate change on water resources and in developing a process to address these impacts. Through detailed dialogues in an urban area in India, we will bring together water stakeholders including water managers, NGOs, and the private sector to identify key needs that water stakeholders have in responding to climate change.

Due to decaying infrastructure, lack of funds, and a variety of other problems, the formal water sector is only able to provide sporadic service to many urban dwellers. Migrant populations and informal settlements in peri-urban areas are not served by the formal water sector. As a result, urban dwellers rely on the informal water sector to supplement or completely fulfill their water needs. Furthermore, the potential impacts of climate change on the water supply and demand cycle rarely enter into the planning and management strategies of the formal sector. The informal water sectors do not even consider climate change and often lack the economic capability to engage in long-term strategies. The dynamics of economic and natural resource migration, with some migrating only on a short-term basis, coupled with the impacts of climate change and social change on water resources, have the potential to completely overwhelm formal urban water sectors in India. This situation is not unique to India, however, and is descriptive of the situations that face many developing country water managers.
We will research the practical adaptation strategies that urban water managers in South Asian cities can make that complement the autonomous adaptation strategies undertaken in the informal sectors and be resilient to a wide variety of unknown climate effects and social change. The research will help guide the development of a framework of action, consisting of a suite of resiliency tools that enable the formal urban water sector to flexibly respond to a variety of uncertain climate and socio-economic scenarios. The flexibility and resiliency of the tools developed from this project will be designed for applicability in other developing country contexts.

B Objective of Research Project *(Limit to one paragraph)*

The goal of this research project is to provide water managers in the urban areas of developing countries with soft tools, such as information, transparency, connectivity, and communication tools, that bridge gaps between the various stakeholders, and help them better manage water insecurity as a result of climate change. There is a complex interaction among a host of different water managers including the government, private suppliers, and communities, who each access the water resource directly or indirectly. The formal water system only provides intermittent water supply to a limited portion of the population. In many places, individual homeowners supplement this supply with their own supply of borewell water, and often the poor are forced to procure their entire water supply from private water tankers at over ten times the cost. Through intensive discussions with government agencies, NGOs and communities in Indore, India we will identify the kinds of tools different stakeholders need to plan for increasing water insecurity due to climate change. After identifying the tools for each stakeholder, we will further develop some key tools for communities, potentially including tools on self-reliance in water and advocacy to demand basic water needs.

C. Approach (including methodological framework, models used, theory developed and tested, project monitoring and evaluation criteria) include a description of the key beneficiaries of the anticipated findings of this project (e.g., decision makers in a particular sector/level of government, researchers, private sector, science and resource management agencies) *(Limit to one page)*

One of the key frameworks used in this project is the methodology of Shared Learning Dialogues, or SLDs. Through Shared Learning Dialogues at multiple levels and over a long period of time, the project researchers are directly interrogating the needs of each stakeholder in better water management in the face of climatic variability as well as iteratively producing analysis and tools that reflect the identified needs.
The SLD process is iterative and deliberative. We will hold a series of 4 SLDs among government agencies, private water suppliers, and a range of communities. Through these SLDs we will build a shared understanding of the mechanisms that would be most useful in dealing with climate variability and its impacts on water, and also iteratively "test" prospective tools that may assist these communities, governments, and private stakeholders in making better decisions.
The SLDs will also bring together a range of stakeholders, so that governments, communities, and the private sector can be better connected, share information, and engage in multi-directional learning. While as outside organizations, the project team brings knowledge of what has worked in other places, the local knowledge can be used to educate governments and the international community about other strategies that may be effective. The SLD process in bringing together the various stakeholders also helps various water managers understand the links between various actors and activities, and make the connections that individual water use affect community water supply and deeper boreholes in one household mean diminishing water supply in a much larger area.
We have also conducted detailed household water management and use surveys to understand the water context in which different households live, what adaptation strategies they currently use to manage water insecurity, and the types of tools and information needs they have in implementing resilience strategies. We iteratively developed an extensive household water survey, tested it in one community, and then deployed throughout Indore through a rigorous survey comprising 200 households.
The intended beneficiaries of this work are all water managers and water decision-makers in an urban context in a developing country, including government agencies, communities and individual residents, and private water suppliers.

D. Description of any matching funds/activities used in this project *(Limit to one paragraph)*
This NOAA project will be happening in parallel to the five year Rockefeller Asian Cities Climate Change Resilience (ACCRN) Initiative, which is working in three Indian cities, of which Indore is one. There are many related areas of work that we have been able to undertake including combining survey instruments, and also conducting joint trainings of surveyors. The Rockefeller ACCRN Initiative also directly funds two of the project partners, ISET and TARU, which are funded through this NOAA project. We have also been able to split travel and per diem costs for staff travel to Indore.

II. ACCOMPLISHMENTS

A. Brief discussion of project timeline and tasks accomplished. Include a discussion of data collected, models developed or augmented, fieldwork undertaken, or analysis and/or

evaluation undertaken, workshops held, training or other capacity building activities implemented. *(This can be submitted in bullet form – limit to two pages)*

TASKS ACCOMPLISHED

PHASE I: Reviewing Climate, Water Resources and Social Change Information
Completed in Year One.

Phase II: Shared Learning Dialogues at multiple levels
We conducted a series of intensive Shared Learning Dialogues in Indore. In addition, we added new scope to the workplan in conducting a comprehensive water survey in Indore. This provided valuable information on the kinds of water problems faced by communities, the adaptation strategies they currently used, and their information and support needs to develop more resilience to water insecurity.

The following tasks were accomplished from March 2009-March 2010.

Field report of visits previously undertaken, March 2009: After collating notes taken during various field visits, a report was prepared by Eva Saroch (ISET) with inputs from Meena Palaniappan (Pacific Institute), Megha Burvey (TARU), Shashikant Chopde and Dilip Singh (ISET). This report was then circulated within the NOAA-ISET portal. The insights from the report fed into the household water questionnaire.

Development of water questionnaire May-June 2009: After brainstorming discussions between Meena Palaanaiapan (Pacific Institute), Shahsikant Chopde, Dilip Singh, Eva Saroch (ISET), GK Bhatt, Manish Singh and Megha Burvey (TARU) for over a month, a comprehensive water questionnaire was finalized. The questionnaire was formulated from knowledge sharing and field surveys undertaken in previous visits.

Selection of the 8 communities for water survey, 24th July 2009: With inputs from the local survey team, Megha Burvey (TARU) and Eva Saroch (ISET) selected 8 communities for the water survey. The 8 selected communities are comprised of slums, LIG, MIG and HIG: Nehru Nagar, Nayapura, Lodha Colony, Jhinsi, Goma Ki Bhel, Sudama Nagar, Sneh Naga and Sunder Nagar. The questionnaire was utilized in 200 households across 8 communities mentioned above.

Orientation of the field team with regard to the water questionnaire, 26th July 2009: A one day orientation on the 'challenges of conducting water surveys in slums/LIG and MIG communities of Indore city' was delivered by Eva Saroch (ISET) and Manish Singh (TARU) to the local NGO Association. During the course of the orientation, the focus was to make the team members (men and women) understand why a particular question is important, how that questions needs to be asked and to whom?

Testing of water questionnaire in Lodha colony (LIG), 27th July 2009: Before utilizing the water questionnaire in all of the selected communities, the questionnaire was tested in Lodha colony. Apart from considering whether the questions posed are generating appropriate responses, the testing also checked and analyzed whether the team adequately understood the questions and the extent to which each member of the team knows 'how and when to ask a particular question' to women and men of the different communities. The field visit was undertaken by Eva Saroch (ISET), Manish Singh, Megha Burvery, and Roma Upadhya (TARU).

Water questionnaire conducted in 200 households across 8 communities: The water questionnaire was conducted in 200 households across 8 selected communities belonging to different SECs. In each community 25 households were selected for this purpose. Random sampling method was used to select households in each community. In approximately 10 days the questionnaire was completed. The data has been jointly analyzed by TARU, ISET and Pacific Institute.

Meeting with Parshad, Mr. Rajesh Ujjavat (Ward 62), 27th July 2009. A discussion was led by Megha Burvey (TARU) and Eva Saroch (ISET) on the water problems faced by the ward and the manner in which the Parshad functions.

Meeting with Zonal office, 28th July 2009: Meeting with zonal officers Mr. Hemant Gupta (Assistant Engineer) and Mr. Sukhbir Singh (Zonal officer) to gain a broader and deeper understanding of the roles and institutional landscape of the zonal office. Questions were mainly regarding the way the complaint redressal mechanism functions and also based on information received from the communities during the SLD.

Conducted Shared Learning Dialogue (SLD) with heterogeneous groups belonging to slums/LIG/MIG/HIG 7- 9th August 2009

a. Framing of questions for each of the SECs for the SLD: appropriate questions for each of the SECs were framed that were to be asked during the SLD. With inputs from Megha Burvey, Roma Upadhaya (TARU) and the field team from Aas, Eva Saroch (ISET) and Manish Singh (TARU) developed a list of questions that broadly tried to capture the perceptions and understanding of water managers on diverse issues such as various patterns of water supply (normal/ scare months/ rainy season): duration/frequency, ranking quality and reliability; defining water scarcity; coping strategy at household and community level; grievance redressal mechanism; defining self-sufficiency and the kind of information they need to better manage their water and from whom.

b. Conducting SLD with the slums/LIG/ MIG/HIG communities: Representatives from each of the communities were asked to participate in the SLD. Care was taken to maximize women representation. The SLD team used various 'participatory and learning exercise' tools to make the SLD (approximately 3 hours) meaningful by focusing on the core of the iterative, shared learning process.

Field visit to Indore: March 16-21st 2010: A field visit was undertaken (see details below) by Eva Saroch, Laura Seraydarian, Shahsikant chopde, Dilip Singh (ISET) and Megha Burvey, Roma Upadhaya (TARU) to conduct various meetings with Madhaya Pradesh Urban Services for Poor (MPUPS)- a project funded by DFID and coordinated by Government of Madhya Pradesh- that focuses on building capacity of selected urban local bodies (ULBs) so that they are well equipped to deliver better services to the poor. Presently MPUSP is being implemented in 19 slums in Indore.

Meeting with Parshad, Mr. Dilip Sharma, Ward 45 (3/17/2010): Megha Burvey (TARU), Eva Saroch and Laura Seraydarian (ISET) led a discussion inquiring about current complaint redressal mechanisms and presented the idea of SMS based

communication for water-related governance. Due to his recent election (6 months ago) he did not have much to say regarding these issues.

Field visit to Asharfi Nagar Slum, (Ward 42) community under the MPUSP project (3/18/2010); Megha Burvey (TARU), Eva Saroch, Laura Seraydarian (ISET), and Taruna Malviya (CDO from MPUSP) visited the community to learn about the current water system and their perspective on NP3. The main purpose of the visit was to immerse new field team members.

Meeting with Zonal office, Mr. Bibesh Jain (3/18/2010): Megha Burvey (TARU), Eva Saroch and Laura Seraydarian (ISET) met with Mr. Jain who provided us an organizational overview of the zonal offices (wards/zonal offices/employees), structure of complaint redressal system and capacity issues within zonal office.

Meeting with MPUSP CDOs, CTC, and Program lead (3/18/2010) Eva Saroch, Laura Seraydarian, Dilip Singh, Shashi Chopde (ISET) and Megha Burvey (TARU) met with the 4 CDOs (Community Development Officers), Mr. Harshvarahan Sharma CTC (City Team Coordinator) and Program Lead from IMC, Mr. Kulshreshtha to discuss MPUSP program as a whole and specifically regarding water supply, governance, and conservation efforts.

Field visit to Udyog Nagar Slum (Ward 50): Megha Burvey (TARU), Dilip Singh, Shashi Chopde, Laura Seraydarian (ISET), and (CDO from MPUSP).

Meeting with Parshad Mrs. Vinita Dharma, Ward 11 (pop. 40,000) (3/19/2010): Dilip Singh, Shashi Chopde, Laura Seraydarian (ISET) met with Mrs. Dharma (elected 2 months ago) to discuss the dynamics of water supply and governance in her ward.

Meeting with Resident Community Volunteers (RCVs) under the MPUSP program at Bajrang Nagar Slum (Ward 1): RCVs are women chosen by their community to represent their lane, there is one RCV per lane within every MPUSP community. The core role of the RCV is to integrate community participation beginning with infrastructure planning and continuing in operation and maintenance. Megha Burvey (TARU), Dilip Singh, Laura Seraydarian (ISET) and ?? (CDO from MPUSP) met with RCVs in their community to discuss their role in the MPUSP project, the types of trainings they have undergone, potential additional trainings they would like to receive and water related efforts/issues regarding supply, governance and conservation.

Meeting with Mr. Prabhish Sankhla, Chief of ADB/NP3 project; Shashi Chopde, Dilip Singh and Laura Seraydarian (ISET) met to receive an updated overview and progress update on the NP3 project.

Phase III: Developing the Decision-Support Tools

We have also begun to develop the framework for the decision-support tool for water managers in the developing country context. We have also developed a framework for an umbrella framework paper to introduce water resource managers to the complex process of assessing and adapting to climate variability into planning.

Phase IV: Disseminating the Tools and Planning Pilot Implementation

We have begun creating connections with existing programs of government agencies and NGOs to disseminate the tools developed through this project.

B. Summary of findings, including their potential or actual implications for efforts to develop applications, methods, and science-based decision support capacity/systems and to foster sustainable resource management and vulnerability reduction. *(Limit to two pages)*

Analysis of SLD outcome: Eva Saroch (ISET) and Manish Singh (TARU) developed a matrix on the basis of SLD outcomes. This matrix enabled us to make a comparative analysis between the water managers belonging to different SECs on diverse water issues related to water resource supply pattern, usage, reliability, quality, complaint redressal mechanism and the diverse notions of water scarcity and self-reliance, the existing coping mechanisms adopted and what kind of information they require to better manage their water (see appendix attached). The important information generated from the SLD along with the field data analysis of the water questionnaire will form the basis for framing the self-reliant tools for water managers in Indore.

MPUSP meeting outcome: As mentioned in Section A, the field team met with members of the MPUSP project and received information on the project as a whole. This meeting led the field team to set up additional meetings with RCVs and visits to MPUSP communities to learn more. In general, the team decided that future collaboration with the MPUSP program would be beneficial for both groups. The idea of utilizing the RCVs, CDOs and others at MPUSP as a vehicle for our initiatives was brought up internally as well as a potential scaling up of the MPUSP project. It was decided that the field team would meet again with MPUSP to discuss moving forward.

RCV meeting outcome: As mentioned in Section A, the field team met with several RCVs from one community in a group setting. This consultation yielded information on RCVs' time spent on MPUSP related work on a daily basis, wages received for training, types of training they received and what they would like to see more of. In general, the RCVs in this community were not concerned with water issues as MPSUP has increased their water supply by adding 3 borewells. They are receiving 400 liters per day per family and are happy with the current situation. Currently, their main focus is on solid waste containment, but they did express interest in trainings on water conservation practices. They were very pleased with the level of involvement they have had from the beginning of the project and find this program exceptional over other government programs. The detailed results, including pricing of water and changes that may occur due to NP3 are provided in the forthcoming trip report.

SMS pilot feedback: SMS piloting was discussed with parshads, MPUSP affiliates, NP3 and TARU. Most individuals liked the idea and thought it would be helpful in relaying information for complaint redresssal and project progression updates, however the cost was a concern for those in slums and LIGs. Additionally, the organizational structure; who would be sending/receiving the messages, how the data would be maintained and the incentives for actual complaint redressal was flagged. It is clear that the design parameters will be indicative of a successful pilot, however, incentives for addressing complaints should also be incorporated into the framework of tools.

C. List of any reports, papers, publications or presentations arising from this project; please send any reprints of journal articles as they appear in the literature. Indicate whether a paper is formally reviewed and published. *(No text limit)*

Presentation made by Eva Saroch (ISET) and Meena Palaniappan (Pacific Institute) entitled "Community Resilience to Water Insecurity as a Result of Climatic Change", at the international conference on Climate Impacts and Adaptation in Asia: Scientific and Technical Conference on Adapting to Climate Change in Asia, August 29-30 2009, Kathmandu, Nepal.

D. Discussion of any significant deviations from proposed workplan (e.g., shift in priorities following consultation with program manager, delayed fieldwork due to late arrival of funds, obstacles encountered during the course of the project that have impacted outcome delivery). *(Limit to one paragraph)*

We have implemented a key extension of our workplan by deciding to conduct a household water management survey among 200 households of varying income classes to identify coping strategies for water insecurity, and information needs to develop more robust adaptation options. Analysis of the survey will be critical in allowing us to develop a framework paper to articulate the concerns and needs and informal and formal water managers, and design and develop a few key tools to help water managers be more resilient to climate change and water insecurity.

E. Where appropriate, describe the climate information products and forecasts considered in your project (both NOAA and non-NOAA); identify any specific feedback on the NOAA products that might be helpful for improvement. (bulleted response)

1) Global Historical Climate Network (GHCN) monthly and daily datasets. The user interface to these datasets could be improved, using a similar access and format as the data access through the PSD (Earth System Research Laboratory: Physical Sciences Division) Interactive Data, Plotting and Analysis Pages.

2) Multiple products through the PSD (www.cdc.noaa.gov) website, particularly the NCEP/Reanalysis project data.

Non-NOAA products are a large group, so only few key products are listed here:
1) Data from the Canadian Centre for Climate Modelling and Analysis
2) Data from the WCRP CMIP3 Multi-Model Dataset Archive at PCMDI
3) Tyndall Centre CRU TS 2.1
4) Data from the European Centre for Medium-Range Weather Forecasts (ECMWF)

III. GRAPHICS: PLEASE INCLUDE THE FOLLOWING GRAPHICS AS ATTACHMENTS TO YOUR REPORT

A. One Power point slide depicting the overall project framework/approach/results to date
Attached

B. If appropriate, additional graphic(s) or presentation(s) depicting any key research results thus far
Attached
C. Photographs (if easy to obtain) from fieldwork to depict study information (if applicable).

IV. WEBSITE ADDRESS FOR FURTHER INFORMATION (IF APPLICABLE)

www.pacinst.org; www.i-s-e-t.org

V. ADDITIONAL RELEVANT INFORMATION NOT COVERED UNDER THE ABOVE CATEGORIES.